The specific gravity of the granular mineral is 3·198, and its hardness 5·5.

The result of the above analyses is to show that, except for a little chromite and a little augite, with possibly in the crystallized mineral a little free silica, both that mineral and the collective silicate of the stone consist of a ferriferous enstatite.

The formula most in accordance with the analysis would be

$$(\tfrac{2}{3}\,Mg\,\tfrac{1}{3}\,Fe)O,\ SiO_2;$$

that of the enstatite in the Breitenbach meteorite is $(\tfrac{4}{5}\,Mg\,\tfrac{1}{5}\,Fe)O,\ SiO_2$.

The bulk of the Busti meteorite consists of a purely magnesian enstatite; this of Manegaum is almost entirely an enstatite richer in iron than any yet examined. Both bear evidence to the white flocculent mineral which characterizes the microscopic sections of many meteorites, being composed of this now important mineral enstatite.

In publishing the results I have obtained in the attempt, so far as this memoir goes, to treat exhaustively of the mineralogy of two important meteorites, I wish to record the obligations I am under to Dr. Flight, Assistant in my Department at the British Museum, for his valuable aid in the chemical portion of the inquiry.

II. "On Fluoride of Silver.—Part I. By George Gore, F.R.S. Received October 5, 1869.

(Abstract.)

This communication treats of the formation, preparation, analysis, composition, common physical properties, and chemical behaviour of fluoride of silver.

The salt was prepared by treating pure silver carbonate with an excess of pure aqueous hydrofluoric acid in a platinum dish, and evaporating to dryness, with certain precautions. The salt thus obtained invariably contains a small amount of free metallic silver, and generally also traces of water and of hydrofluoric acid, unless special precautions mentioned are observed. It was analyzed by various methods: the best method of determining the amount of fluorine in it consisted in evaporating to dryness a mixture of a known weight of the salt dissolved in water, with a slight excess of pure and perfectly caustic lime in a platinum bottle, and gently igniting the residue at an incipient red heat until it ceased to lose weight. By taking proper care, the results obtained are accurate. The reaction in this method of analysis takes place according to the following equation, $2AgF+CaO=CaF_2+2Ag+O$. Sixteen parts of oxygen expelled equal thirty-eight parts of fluorine present. One of the methods employed for determining the amount of silver consisted in passing dry ammonia over the salt in a platinum boat and tube at a low red heat. The results ob-

tained in the various analyses establish the fact that pure fluoride of silver consists of 19 parts of fluorine and 108 of silver.

Argentic fluoride is usually in the form of yellowish brown earthy fragments; but when rendered perfectly anhydrous by fusion, it is a black horny mass, with a superficial satin lustre, due to particles of free silver. It is extremely deliquescent and soluble in water; one part of the salt dissolves in ·55 part by weight of water at 15°·5 C.; it evolves heat in dissolving, and forms a strongly alkaline solution. It is nearly insoluble in absolute alcohol. The specific gravity of the earthy-brown salt is 5·852 at 15°·5 C.; the specific gravity of its aqueous solution, at 15°·5 C., saturated at that temperature, is 2·61. By chilling the saturated solution, it exhibited the phenomenon of supersaturation and suddenly solidified, with evolution of heat, on immersing a platinum plate in it. The solution is capable of being crystallized, and yields crystals of a hydrated salt; the act of crystallization is attended by the singular phenomenon of the remainder of the salt separating in the anhydrous and apparently non-crystalline state, the hydrated salt taking to itself the whole of the water. The fused salt, after slow and undisturbed cooling, exhibits crystalline markings upon its surface.

The dry salt is not decomposed by sunlight; it melts below a visible red heat, and forms a highly lustrous, mobile, and jet-black liquid. It is not decomposed by a red heat alone; but in the state of semifusion, or of complete fusion, it is rapidly decomposed by the moisture of the air with separation of metallic silver; dry air does not decompose it. In the fused state it slightly corrodes vessels of platinum, and much more freely those of silver.

The salt in a state of fusion with platinum electrodes conducts electricity very freely, apparently with the facility of a metal, and without visible evolution of gas or corrosion of the anode; a silver anode was rapidly dissolved by it, and one of lignum-vitæ charcoal was gradually corroded. A saturated aqueous solution of the salt conducted freely with electrolysis, crystals of silver being deposited upon the cathode, and a black crust of peroxide of silver upon the anode; no gas was evolved; with *dilute* solutions gas was evolved from the anode. By electrolysis of anhydrous hydrofluoric acid with silver electrodes, the anode was rapidly corroded.

The electrical order of substances in the fused salt was as follows, the first-named being the most positive: silver, platinum, charcoal of lignum-vitæ, palladium, gold. In a dilute aqueous solution of the salt, the order found was: aluminium, magnesium, silicon, iridium, rhodium, and carbon of lignum-vitæ, platinum, silver, palladium, tellurium, gold.

The chemical behaviour of the salt was also investigated. In many cases considerable destruction of the platinum vessels occurred, either in the experiments themselves, or in the processes of cleaning the vessels from the products of the reactions.

Hydrogen does not decompose the dry salt, even with the aid of sunlight, nor does a stream of that gas decompose an aqueous solution of the salt, but the dry salt is rapidly and perfectly decomposed by that gas at an incipient red heat, its metal being liberated.

Nitrogen has no chemical effect upon the salt, even at a red heat, nor upon its aqueous solution. Dry ammonia gas is copiously absorbed by the dry salt. In one experiment the salt absorbed about 844 times its volume of the gas. The salt in a fused state is rapidly and perfectly decomposed by dry ammonia gas, and its silver set free. A saturated solution of the salt is also instantly and violently decomposed by strong aqueous ammonia.

Oxygen has no effect either upon the dry salt at 15° C., or at a red heat, nor upon its aqueous solution. Steam perfectly and rapidly decomposes the salt at an incipient red heat, setting free all its silver. No chemical change took place on passing either of the oxides of nitrogen over the salt in a state of fusion.

By passing anhydrous hydrofluoric acid vapour over perfectly anhydrous and previously fused fluoride of silver, at about 60° Fahr., distinct evidence of the existence of an acid salt was obtained. This acid salt is decomposed by a slight elevation of temperature.

Numerous experiments were made to ascertain the behaviour of argentic fluoride in a state of fusion with chlorine, and great difficulties were encountered in consequence of the extremely corrosive action of the substances when brought together in a heated state. Vessels of glass, platinum, gold, charcoal, gas carbon, and purified graphite were employed*. By heating the salt in chlorine, contained in closed vessels, formed partly of glass and partly of platinum, more or less corrosion of the glass took place, the chlorine united with the platinum and fluoride of silver to form a double salt, and a vacuum was produced. By similarly heating it in vessels composed wholly of platinum, the same disappearance of chlorine, the same double salt, and a similar vacuum resulted. Also, by heating it in vessels composed partly of gold, an analogous double salt, the same absorption of chlorine and production of rarefaction were produced. And by employing vessels partly composed of purified graphite, a new compound of fluorine and carbon was obtained.

III. "Approximate determinations of the Heating-Powers of Arcturus and *a* Lyræ. By E. J. Stone, F.R.S., First Assistant at the Royal Observatory, Greenwich. Received October 13, 1869.

About twelve months ago I began to make observations upon the heating-power of the stars. My first arrangements were simply these: I made

* In the next communication will be described the results obtained with vessels formed of other materials.